

Problem Solving

Exponential and Logarithmic Equations and Inequalities

While John and Cody play their favorite video game, John drinks 4 cups of coffee and a cola, and Cody drinks 2 cups of brewed tea and a cup of iced tea. John recalls reading that up to 300 mg of caffeine is considered a moderate level of consumption per day. The rate at which caffeine is eliminated from the bloodstream is about 15% per hour.

Caffeine Content of Some Beverages	
Beverage	Caffeine (mg per serving)
Brewed coffee	103
Brewed tea	36
Iced tea	30
Cola	25

- John wants to know how long it will take for the caffeine in his bloodstream to drop to a moderate level.
 - How much caffeine did John consume?

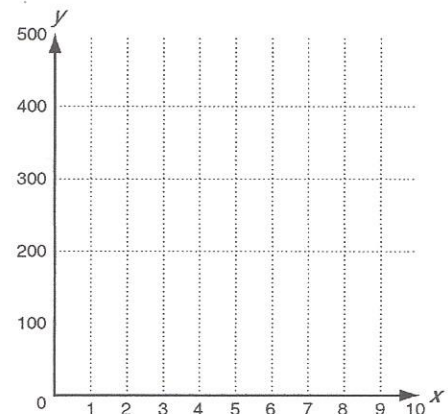
 - Write an equation showing the amount of caffeine in the bloodstream as a function of time.

 - How long, to the nearest tenth of an hour, will it take for the caffeine in John's system to reach a moderate level?

- a. Cody thinks that it will take at least 8 hours for the level of caffeine in John's system to drop to the same level of caffeine that Cody consumed. Explain how he can use his graphing calculator to prove that.

b. What equations did Cody enter into his calculator?

c. Sketch the resulting graph.



Choose the letter for the best answer.

- About how long would it take for the level of caffeine in Cody's system to drop by a factor of 2?
 - 0.2 hour
 - 1.6 hours
 - 2.7 hours
 - 4.3 hours
- If John drank 6 cups of coffee and a cola, about how long would it take for the level of caffeine in his system to drop to a moderate level?
 - 0.5 hour
 - 1.6 hours
 - 4.7 hours
 - 5.3 hours